

From: [Harrington, Dwayne](#)
To: charger22@aol.com
Subject: Fwd: Facility's engineer's report attached
Date: Friday, July 8, 2016 11:42:31 AM
Attachments: [PihoReport.6.30.16.SouthJerseyIce.pdf](#)
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From: "Harrington, Dwayne" <Harrington.Dwayne@epa.gov>
Date: July 8, 2016 at 10:49:34 AM EDT
To: "Banner, Ellen" <Banner.Ellen@epa.gov>
Subject: Facility's engineer's report attached

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TRIP REPORT – June 28, 2016

Date: January 28, 2016 Revision 0
Project Name: South Jersey Ice & Cold Storage LLC Review of Ammonia Refrig System
Project No: SJI-2018
Prepared By: John Piho, PE.
Distribution: John Piho Piho Engineering
Mark DiMeo South Jersey Ice & Cold Storage LLC
Jeffrey DiLazzero Law Office of Jeffrey DiLazzero

GENERAL:

South Jersey Ice & Cold Storage LLC ("South Jersey Ice") has retained Piho Engineering to review the ammonia refrigeration system operation and installation. The ammonia refrigeration system is reported to hold about 4000 Lbs. of ammonia.

The review was conducted based upon 2012 New Jersey Mechanical Code and 2012 New Jersey Fire Code, IMC-2009 International Mechanical Code, IFC-2009 International Fire Code, ASME B31.5-2013 Refrigeration Piping and Heat Transfer Components, ASHRAE 15 Safety Standard for Refrigeration Systems, and ASME B31G Manual for Determining the Remaining Strength of Corroded Pipelines.

The review was performed by John Piho, PE in accordance with the codes. Assistance was provided by South Jersey Ice personnel familiar with the refrigeration system.

SUMMARY:

Overall for a refrigeration system in excess of 60 years old it has been maintained very well. South Jersey uses a reputable outside contractor to do its maintenance and capital improvement work. The items discussed below should be addressed in the near future.

Additional note. South Jersey Ice has begun the removal process of product from the warehouse. The refrigeration system will remain active until this is complete and then the refrigeration system operational status will be reviewed. In the meantime, the following safety precautions are in the process of being implemented.

OBSERVATIONS & DISCUSSIONS:

Summary of Site Visit Observations.

We have listed the major observations and recommendations as follows:

1. Frost and ice build up on the pipe coils is prevalent in several areas. I recommend removal of the frost and ice on the pipe coils as soon as possible. I recommend starting with top floor then working down. It was reported that removal of frost and ice occurs about every 8 years. It should also be noted that the buildup of ice will grow to a point and reach a point of equilibrium where the growth of ice will cease or slow down. Preferred method is to

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manually remove ice. My understanding is that South Jersey Ice has or will be hiring a third-party contractor to start removing excess frost and ice build up on the pipe coils in the immediate future.

2. The reliefs currently appear to be in working order. However, the reliefs are out of date and need to be replaced or recertified per ASME UG-125 thru UG-137. ASME requires reliefs to be replaced or recertified every 5 years from date of install.
3. Dual relief assemblies are normally required on vessels greater than 10 cubic feet volume unless provisions are made to isolate the vessel and pump it down, then a single relief is allowed. Reference ASHRAE 15 Safety Standard for Refrigeration Systems Paragraph 9.7.2.3. Even though we see single reliefs on the High Pressure Receiver, Pump Package, Dump Tank, and Shell & Tube Condensers I would recommend consideration be given to dual reliefs for ease of replacement. The Frick Screw Compressors have Dual Relief Assemblies on them and are current.
4. Relief Piping needs to be reviewed and sizes checked. Piping should be installed per 2012 New Jersey Mechanical Code and 2012 New Jersey Fire Code. Currently what we observed is piping basically sticking through the wall of the machinery room.
5. Ammonia detection is installed in the Machinery Room and each space that ammonia passes through consistent with current codes. The machinery room detectors alarm and shut down the ammonia refrigeration system based on Parts per Million (PPM) levels. We understand they are set at 100 PPM for shutdown. Shutdown at the 100 PPM will shut off compressors and pumps (rotating equipment). Alarm levels for each detector are set at 25 PPM throughout the building. I recommend that the detectors be recalibrated to make sure that they are working properly. The safety trips should also be verified. Currently sensors come back to a auto dial panel and the owner gets notified if ammonia is detected.
6. Ventilation System operation and capacity needs to be verified. The exhaust system should be tied into the ammonia detection so that if levels reach the trip point the exhaust system will be activated. Exception is if the exhaust and supply air are run continuously. Reference 2012 New Jersey Mechanical Code and 2012 New Jersey Fire Code.

Levels are 25 PPM to alarm, and 100 PPM to shut down rotating equipment as reported above.

7. There is no Emergency shut down, manual fan activation, or visual and audible alarm station outside the primary entrances to the Machinery Room. This is required by 2012 New Jersey Mechanical Code and 2012 New Jersey Fire Code.
8. Safety interlocks for a high level alarm condition needs to be verified and that the compressors will shut down.
9. Ammonia piping and equipment has normal ice buildup from operation and insulation failure over the years. Monitor and replace insulation and vapor barrier when timing permits.
10. I did detect a slight smell of ammonia depending where I stood in the Machinery Room. This was traced to a valve packing and was being addressed.

11. Ammonia charge calculations. It was reported that there is about 4000 Lbs. of ammonia in the system. Reviewing the operation and based on our experience we would agree this is about the quantity. We would recommend an ammonia charge calculation be performed. Unfortunately this will be very difficult with the amount of ice prevalent and lack of drawings to check sizes of pipe. Vessel information is available and catalog data is available for installed items.
12. Ammonia Piping and Equipment drawings and labels. Ideally in the future as time permits develop Refrigeration system Drawings documenting the system as installed. Label equipment and piping with current standards following IIAR Guidelines.

ADDITIONAL ITEMS BASED ON EPA VISIT 6-28-16:

The EPA visited the site on 6/28/2016 during our visit. Based on observations and discussion with the EPA, South Jersey Ice agreed to tie the Ammonia Reliefs together and pipe them to a water tank.

We have sketched out a proposed pipe schematic and water tank size which is attached. These calculations have been based on the 2012 New Jersey Mechanical Code and 2012 New Jersey Fire Code and ASHRAE 15 Safety Standard for Refrigeration Systems.

The code language for ammonia discharge into a water tank is as follows:

9.7.8.2 Ammonia Discharge. Ammonia from pressure relief valves shall be discharged into one or more of the following:

- a. The atmosphere, per Section 9.7.8
- b. A tank containing one gallon of water for each pound of ammonia (8.3 litres of water for each kilogram of ammonia) that will be released in one hour from the largest relief device connected to the discharge pipe. The water shall be prevented from freezing. The discharge pipe from the pressure-relief device shall distribute ammonia in the bottom of the tank but no lower than 33 ft (10 m) below the maximum liquid level. The tank shall contain the volume of water and ammonia without overflowing.

-END -

Attach: Ammonia Relief Piping sketch and water tank